PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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AUTRICHE

PCT

15.05.06 Ingestellt

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	21.04.2006
Applicant's or agent's file reference CT 7614/cm	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP2004/012860	12.11.2004	13.11.2003

Applicant
TREIBACHER INDUSTRIE AG et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference CT 7614/cm	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2004/012860	International filing date *(day/month/year)* 12.11.2004	Priority date *(day/month/year)* 13.11.2003

International Patent Classification (IPC) or national classification and IPC
INV. B01J23/22 B01J23/10 B01D53/94

Applicant
TREIBACHER INDUSTRIE AG et al.

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 2 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in celectronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13.09.2005	21.04.2006

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/012860

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☐ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-15 as originally filed

Claims, Numbers

1-11 received on 17.09.2005 with letter of 13.09.2005

Drawings, Sheets

1/5-5/5 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-11
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

   D1: EP-A-0 787 521 (EBARA CORP ; MITSUBISHI CHEM CORP (JP)) 6 August 1997 (1997-08-06)
   D2: US-A-4 221 768 (INOUE AKIRA ET AL) 9 September 1980 (1980-09-09)
   D3: GB-A-1 430 730 (MITSUBISHI CHEM IND) 7 April 1976 (1976-04-07)
   D4: GB-A-2 149 680 (NIPPON CATALYTIC CHEM IND) 19 June 1985 (1985-06-19)
   D5: US-A-4 466 947 (ARIMA YUSAKU ET AL) 21 August 1984 (1984-08-21)
   D6: PATENT ABSTRACTS OF JAPAN vol. 0030, no. 75 (C-050), 27 June 1979 (1979-06-27) & JP 54 052691 A (NIPPON STEEL CORP), 25 April 1979 (1979-04-25)
   D7: US-A-4 719 192 (SCHNEIDER MICHAEL ET AL) 12 January 1988 (1988-01-12)
   D8: PATENT ABSTRACTS OF JAPAN vol. 1999, no. 13, 30 November 1999 (1999-11-30) & JP 11 216361 A (TOSHIBA CORP), 10 August 1999 (1999-08-10)
   D9: US-A-5 300 472 (BRAND REINHOLD ET AL) 5 April 1994 (1994-04-05)

2. The amendments filed with the letter dated 13.09.2005 do not introduce subject-matter which extends beyond the content of the application as filed. They are based i.a. on claim 5 as originally filed and meet the requirements of Article 34(2)(b) PCT.

3. The present application meets the requirements of Article 33(1) PCT, because the subject-matter of claims 1 to 11 is novel in the sense of Article 33(2) EPC.

   The subject-matter of claim 1 differs from the supported catalysts of the prior art in that the support comprises 5 to 20 wt-% of tungsten oxide.

4. However the subject-matter of claims 1 to 11 does not involve an inventive step in the

sense of Article 33(3) PCT in view of at least one of the documents D1 to D6 (cf. the passages quoted in the search report).

4a. In his letter of reply dated 13.09.2003, the applicant considered D1 as the closest prior art.

D1 discloses a catalyst for the decomposition of nitrogen oxides in exhaust gases. It comprises in a preferred embodiments of the examples catalysts composition consisting of vanadium and yttrium oxides supported on titania particles or a titania-coated honeycomb substrate. The attention is more particularly drawn to example 3 and Table 4.

The subject-matter of present claim 1 of the application differs from the catalyst of D1 in that the support further comprises 5 to 20 wt% of WO_3.

4b. According to the applicant, "the extraordinary efficacy of the inventive catalysts is documented in detail in the present description". However, there is no evidence in the application that the addition of 5 to 20 wt% of WO_3 in the titania support should provide an unexpected technical effect or solve a specific technical problem by comparison with a catalyst according to D1 with a support only comprising titania.

In the application the catalysts of the examples, included the comparative example, are all supported on titania support comprising amount of WO_3, which are within the definition of claim 1 of the application. Said examples cannot be used as evidence for showing a technical effect, which would be due to the introduction of amounts of WO_3 according to present claim 1 of the application.

In view of the application as originally filed there is no particular reason to add such amounts. The values were obviously picked up in the description in order to establish novelty over catalysts of the cited documents, which are supported on pure titania or silica-containing titania supports.

The state of the art according to the application was represented by supported catalysts, the titania-comprising support already containing some WO_3 (cf. i.a. page

1, line 32 to page 2, line 8, page 3, lines 6-8 and 22-26, and the comparative example). The technical problem of the application was to improve the thermal stability at higher temperatures of the existing titania-WO_3 supported catalysts by promoting said catalysts with rare earths (page 3, lines 6-8). The application does not comprise evidence that the content of WO_3 should be particularly essential for some purpose.

Actually the applicant failed to establish that the subject-matter of claims 1 to 11 does not involve an inventive step in view of D1.

4c. In view of the fact that the applicant has admitted in the application that the technology of the application is commercially operated with catalysts carried on a titania-WO_3 support, which may optionally also comprise some vanadia and silica, the subject-matter of claims 1 to 11 lacks an inventive step in view of the said commercial prior art and D3.

D3 discloses a catalyst for the same purpose as in the application. The catalytic component comprises a combination of vanadium oxide and cerium oxide on a heat resistant support. Titania is a possible support material. The catalyst of claim 1 of the application differs from the disclosure of D3 in that the support should comprises both titania and WO_3.

Such a support is not explicitly discloses in the list of exemplary support materials according to D3 (page 2, lines 84 to 94). However, D3 is an old document (1974) does not indicate any particular restriction with regard to the choice of the support. It is within the ambit of the skilled man to implement the teaching of D3 with any heat resistant material, more particularly the commercially presently used catalyst supports having the requisite heat resistance (thermal stability) set out in D3 without the exercise of inventive skill, in order to solve the problem posed. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to use catalyst supports according to page 1, line 32 to page 2, line 8 of the application with corresponding effect to a catalyst composition according to document D3 (page 2, lines 84-94), thereby necessarily arriving at a catalyst composition according to claim 1 of the application.

4d. Some attention should be further drawn to D5 (column 5, lines 32-39 and example 1).

Example 1 of D5 is slightly corresponding to the prior art as identified in the present application. It discloses a catalyst composition comprising vanadium oxide supported on a solid support made of titania and WO_3. The composition of said catalyst differs from claim 1 of the application in that it does not comprise rare earth elements. The catalyst is obtained by a process differing from that of claim 5 of the application, because the impregnation solution does not comprise rare earth salts. Example 1 of D5 is close to the comparative example of the application.

However, it belongs to the disclosure of D5 that the catalyst composition of D5 can further comprise additional elements. The list comprises rare earth elements and Yttrium in an amount of not more than 5 wt-%. The additional elements being listed in a single list, applying the teaching of D5 does not involve a selection. Independently of the technical problem of the application, it is within the normal ambit of the skilled man to reproduce one by one the composition resulting from the addition of each of the additional elements in a composition according to example 1 of D5 simply to repeat the teaching of D5 and without the exercise of an inventive step.

Due to the lack of evidence in the application, it is not possible to identify whether the alternative preparation processes of claims 6 and 7 provide a technical effect by comparison to the process of claim 5. Therefore claims 6 and 7 does not involve an inventive step in view of D5.

Consequently, the subject-matter of at least claims 1 to 11 lacks an inventive step in view of D5 taken alone.

4e. D2 discloses a catalyst for the decomposition of nitrogen oxides in exhaust gases. It comprises in a preferred embodiments of the examples catalysts composition consisting of vanadium and cerium oxides supported on titania particles. The attention is more particularly drawn to example 27 in combination with example 1 and Table 6. The catalyst composition of claim 1 differs from said catalyst compositions of D2 in that some WO_3 is present in the support.

Due to the lack of evidence in the application, that the presence of WO_3 in the support provide a technical effect and that the alternative preparation process of claims 6 and 7 provide a technical effect by comparison to the standard impregnation process of claim 5, the subject-matter of claims 1, 5, 6 and 7 does not involve an inventive step in view of D2.

The subject-matter of claims 2, 3, 8 and 9 apparently lack an inventive step in view of the combination of D2 and D5 (column 5, lines 32-39 and example 1), or D2 and D6. D5 and D6 disclose catalyst compositions for the same purpose as in the present application.

4f. For reasons indicated in view of D2, the subject-matter of claims 1, 5 to 7, 10 and 11 does not involve an inventive step in view of D3 or D4. The subject-matter of claims 2, 3, 8 and 9 does not involve an inventive step in view of the combination of any one of D3 and D4 with either D5 or D6.

Re Item VIII
Certain observations on the international application

1. Claims 10 and 11 do not meet the requirements of Article 6 and Rule 6 PCT. It is assumed that the processes of claims 5 to 9 are directed to the preparation of catalysts according to claim 1 of the application. Therefore, claim 10 is redundant, so that the requirement of conciseness is not met.

2. claim 11 refers back to claim 10 and indirectly to claims 5 to 9. Consequently, the ranges indicated in claims 5 to 7 also apply to the compositions of claims 10 and 11. In claim 11 the value of "at least 65 wt-%" for titania is not compatible with the value of 70 wt-% indicated in claims 5 to 7. Due to this inconsistency claims 10 and 11 do not meet the requirements of Article 6 PCT. In view of the reference to claims 5 to 7, claim 11 does not comprise features other than those of claim 1 of the application. It is redundant with claim 1 and should be deleted.

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Claims

1. Catalyst composition represented by the general formula

REVO/S

wherein
RE is at least one of the group of rare earth metals Y, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Er and Yb in an amount of up to 6.0 wt.-%;
V is vanadium in an amount of 0.2-2.5 wt.-%;
O is oxygen in an amount of up to 3.5 wt.-%; and
S is a support containing TiO_2 in an amount of at least 70 wt.-%, WO_3 in an amount of 5-20 wt.-%, and optionally SiO_2 in an amount of up to 15 wt.-%.

2. Catalyst composition according to claim 1, characterized in that RE is at least one of the group of Pr, Sm, Gd, Tb, Dy and Er and particularly one of the group of Sm, Gd, Tb, Dy and Er.

3. Catalyst composition according to claim 2, characterized in that RE is at least one of Er and Tb.

4. Catalyst composition according to any of claims 1-3, characterized in that S contains SiO_2 in an amount or 4-12 wt.-%, particularly in an amount of 5-10 wt.-%.

5. Process for the preparation of a catalyst composition, characterized in that a solid support containing TiO_2 in an amount of at least 70 wt.-%, WO_3 in an amount of 5-20 wt.-%, and optionally SiO_2 in an amount of up to 15 wt.-%, is contacted with an aqueous solution containing a vanadium salt and a salt of at least one rare earth metal selected from the group of Y, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Er and Yb to give a slurry which is brought to dryness and calcined.

6. Process for the preparation of a catalyst composition, characterized in that a solid support containing TiO_2 in an amount of at least 70 wt.-%, WO_3 in an amount of 5-20 wt.-%, and optionally SiO_2 in an amount of up to 15 wt.-%, is contacted with a vanadium salt and a hydroxide of at least one rare earth metal selected from the group of Y, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Er and Yb to give a slurry which is brought to dryness and calcined.

7. Process for the preparation of a catalyst composition, characterized in that a solid support containing TiO_2 in an amount of at least 70 wt.-%, WO_3 in an amount of 5-20 wt.-%, and optionally SiO_2 in an amount of up to 15 wt.-%, is contacted with a vanadate (REVO4) of at least one rare earth metal selected from the group of Y, Ce, Pr, Nd, Sm, Gd, Tb, Dy, Er and Yb to give a slurry which is brought to dryness and calcined.

8. Process according to claim 5, characterized in that the rare earth metal is at least one of the group of Pr, Sm, Gd, Tb, Dy and Er and particularly one of the group of Sm, Gd, Tb, Dy and Er.

9. Process according to claim 6, characterized in that the rare earth metal is at least one of Tb and Er.

10. Catalyst composition obtainable according to a process of one of the claims 5 to 9.

11. Catalyst composition according to claim 10, containing
said rare earth metal in an amount of up to 6.0 wt.-%;
vanadium in an amount of up to 2.5 wt.-%;
oxygen in an amount of up to 3.5 wt.-%;
TiO_2 in an amount of at least 65 wt.-%,
WO_3 in an amount of up to 20 wt.-%,
and optionally SiO_2 in an amount of up to 15 wt.-%.